Internal Migration in Japanese Postwar Development

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C O N T E N T S

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F I G U R E S

ABSTRACT ————————————————————————

In postwar Japan, both trends and patterns of internal migration have dramatically changed. The present paper discusses the process of mobility transition and its interaction with rapid industrialization. In Section II of the paper, the change in the types of internal migration observed in the past three decades is analyzed, and its effect upon population redistribution is examined. In Section III, the determinants of interprefectural migration are identified, using data from the 1970 and 1980 Population Censuses. Section IV deals with an analysis of the interrelationships between rural-urban migration and economic development by heavily drawing upon a reduced form of the Harris-Todaro model.

I. Introduction

Although the tempo of Japan's urbanization was relatively slow
before World War II, it accelerated at a surprising rate in the post-
war period.   In 1950, for instance, the proportion of those residing
in urban areas was only 37%, but by 1980, the proportion had increased
to 76%.

Such rapid urbanization in postwar Japan was accompanied by a
pronounced shift of the labor force from rural agricultural to urban
nonagricultural sectors. In 1950, 49% of the Japanese labor force was
engaged in the primary industry, 22% in the secondary industry, and
30% in the tertiary industry.   In 1980, however, 11% of the labor
force belonged to the primary industry, 34% to the secondary industry,
and 55% to the tertiary industry.

In a country like Japan, where natural resources are scarce, an
inflow of high-quality human resources from labor-surplus agricultural
areas to labor-deficient nonagricultural sectors was essential for
industrialization.   For instance, the volume of rural-to-urban migra-
tion increased markedly during the 1960s when Japan's real GNP grew at
a rate of about 11% a year.   In the 1970s, however, the pace of her
economic growth declined to 5% per annum, which in turn directly
influenced the size and pattern of population movements.   The average
annual number of migrants from nonmetropolitan to metropolitan areas
was approximately 1.16 million for the 1960s, but it decreased to less
than 1 million for the 1970s.   The proportion of this type of migra-
tory flow was 33% of the total migration in the 1960s, but only 26% in
the 1970s.

In the present paper, we will attempt to clarify the basic
processes of internal migratory streams in relation to the dynamic
economic transformation of postwar Japan. Section II will discuss the
trends and patterns of internal migration observed in the past three
decades, the effect of such internal migration upon population
redistribution, and the characteristics of the migrants.   In Section
III, the determinants of interprefectural migration will be analyzed,
using data from the 1970 and 1980 Population Censuses.   Section IV
will   deal with an analysis of the interrelationships between   rural-
urban migration and economic development by heavily drawing upon a

reduced form of the Harris-Todaro model. The final section will summarize some of the main findings of the paper.

To facilitate the discussions that follow, two maps of Japan, one based upon the 47 administrative divisions called "prefectures", and the other based upon 11 regional groupings are included in Appendix I.

II. Mobility Transition in Postwar Japan

A. Trends and Patterns of Internal Migration

Since 1954, the Bureau of Statistics of the Office of the Prime Minister has been publishing the <u>Migration Report Based on Resident Registration</u> on an annual basis. In this report series, intermunicipality migration data have been compiled at various administrative levels such as city, ward, town, and village.[1] Let us analyze, by utilizing this data source, the trends and patterns of intermunicipality migration over the period 1954-1983.

Table 1 displays the total number of intermunicipality migrants and the mobility rate for each year over the period under review. Although there were a few fluctuations in the late 1950s, the number of intermunicipality migrants showed a continuous upward trend from 1956 to 1973. It reached 6 million in 1961, exceeded 7 million in 1964, and surpassed 8 million in 1969. Following the first oil crisis in October 1973, however, the number of intermunicipality migrants decreased almost continuously up to 1983. There were approximately 6.7 million migrants in 1983, which corresponded to the level observed in the early 1960s.

These changes in the quantity of migratory streams among munici- palities are also reflected in the intermunicipality mobility rates,[2] as indicated in Table 1. As compared with the changes in the number of municipality migrants, one can note more fluctuations in the intermunicipality mobility rate. By and large, the mobility rate was on the upward trend from the mid-1950s throughout the 1960s. Starting from 1970, however, it has been continuously falling; it was only 5.6% in 1983, the second lowest level over the entire sample period in question.

Some of the earlier studies have hypothesized that these changes in the intermunicipality mobility rate had largely been affected by

Table 1. Changes in Total Number of Intermunicipality
Migrants and in Intermunicipality Mobility
Rate, 1954-1983

Year	Number of Migrants (1,000 persons)	Mobility Rate[a] (%)
1954	5,498	6.27
1955	5,141	5.80
1956	4,860	5.43
1957	5,268	5.83
1958	5,294	5.81
1959	5,358	5.82
1960	5,653	6.09
1961	6,012	6.42
1962	6,580	6.95
1963	6,937	7.26
1964	7,257	7.51
1965	7,381	7.56
1966	7,432	7.55
1967	7,479	7.51
1968	7,775	7.72
1969	8,126	7.97
1970	8,273	8.02
1971	8,360	8.00
1972	8,350	7.88
1973*	8,539	7.87
1974	8,027	7.30
1975	7,544	6.78
1976	7,392	6.57
1977	7,395	6.51
1978	7,292	6.37
1979	7,295	6.32
1980	7,067	6.07
1981	6,902	5.89
1982	6,852	5.81
1983	6,674	5.62

a/Total number of intermunicipality migrants/
  mid-year total population x 100

*From this year onward, Okinawa is included in the data.

Source: Bureau of Statistics, Office of the Prime Minister,
Migration Report Based on Resident Registration,
various years.

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the performance of economic growth and the size of cohorts entering the labor force.[3/] To statistically test the validity of this hypothesis, we have regressed the intermunicipality mobility rate (MR) on the deviation of the logarithm of real gross domestic product from its trend (GROWTH) and the percent share of those aged 15-19 in the productive population aged 15-64 (COHORT), using annual data from 1954 to 1983. The former explanatory variable is expected to reflect the influence on population movements induced by changes in the general economic situation, while the latter represents the effect of age compositional shifts in the working-age population. The regression result is shown as below:

$$MR_t = 6.281 + 5.334 \ GROWTH_t + 0.0309 \ COHORT_t$$
$$(0.494) \ (0.685) \qquad (0.036)$$

$$D - W = 1.171; \ R^{-2} = 0.669 \qquad (1)$$

where the values in the parentheses beneath the estimated coefficients represent standard errors. Although the coefficients for both GROWTH and COHORT show correct signs, only the former is statistically significant. It should be stressed, however, that when the same behavioral equation is fitted to the subsample period 1954-1970, both coefficients are statistically significant and conform to a priori expectations, as shown below:

$$MR_t = 3.579 + 9.249 \ GROWTH_t + 0.2041 \ COHORT_t$$
$$(1.359) \ (0.851) \qquad (0.0088)$$

$$D - W = 1.087; \ R^{-2} = 0.899 \qquad (2)$$

where the coefficient for GROWTH is statistically significant at the 1% significance level, and that for COHORT at the 5% significance level. These regression results imply that the above hypothesis, advanced by previous studies, is valid in explaining the intermunicipality mobility mechanism observed over the period of high economic growth.

Let us further examine the changes in migratory flow in terms of the following two types: (i) interprefectural migration and (ii)

Table 2. Changes in Interprefectural and Intraprefectural
Migratory Streams, 1954-1983

Year	Interprefecture		Intraprefecture	
	Number of Migrants (1,000 persons)	Mobility Rate[a/] (%)	Number of Migrants (1,000 persons)	Mobility Rate[b/] (%)
1954	2,353	2.68	3,146	3.59
1955	2,227	2.51	2,914	3.29
1956	2,122	2.37	2,738	3.06
1957	2,380	2.64	2,888	3.20
1958	2,381	2.61	2,914	3.20
1959	2,443	2.65	2,915	3.17
1960	2,680	2.89	2,973	3.20
1961	2,952	3.15	3,060	3.27
1962	3,303	3.49	3,277	3.46
1963	3,473	3.63	3,464	3.62
1964	3,634	3.76	3,622	3.75
1965	3,692	3.78	3,688	3.78
1966	3,684	3.74	3,748	3.81
1967	3,761	3.78	3,718	3.73
1968	3,937	3.91	3,838	3.81
1969	4,116	4.04	4,010	3.93
1970	4,235	4.11	4,038	3.92
1971	4,257	4.07	4,103	3.92
1972	4,157	3.92	4,193	3.96
1973	4,234	3.90	4,304	3.97
1974	3,932	3.58	4,094	3.72
1975	3,698	3.32	3,846	3.46
1976	3,565	3.17	3,827	3.40
1977	3,568	3.14	3,828	3.37
1978	3,487	3.04	3,804	3.32
1979	3,469	3.00	3,826	3.31
1980	3,356	2.88	3,711	3.19
1981	3,318	2.83	3,584	3.06
1982	3,288	2.79	3,564	3.02
1983	3,196	2.69	3,478	2.93

a/Total number of interprefectural migrants/
 mid-year total population x 100

b/Total number of intraprefectural migrants/
 mid-year total population x 100

Source: Bureau of Statistics, Office of the Prime Minister, Migration
Report Based on Resident Registration, various years.

intraprefectural migration. Table 2 presents the pattern of these two migratory streams from 1954 to 1983. It can easily be noted from this table that both movements have shown similar trends. The number of interprefectural migrants was more than 4 million from 1969 to 1973, and the same is true of intraprefectural migrants from 1969 to 1974. As was the case with total intermunicipality migration, both streams decreased after the first oil crisis in 1973.

It should be noted, however, that as reflected in the change in the interprefectural and intraprefectural mobility rates, the percentage share of each type of migration differs considerably over the period in question. In 1954, 42.8% of migration was of the interprefectural type. This proportion rose almost continuously until 1970. Over the period 1962-1971, with the exception of 1966, more than 50% of migration was recorded as interprefectural moves. Beginning from 1971, it diminished continuously throughout the 1970s, but has levelled off in the 1980s.

On the basis of these observed patterns, one may hypothesize that when overall mobility rises in response to faster economic growth, migration between prefectures grows faster than that within prefectures. Putting this hypothesis differently, prefectural income disparities increase with economic growth, which in turn, induce a greater volume of interprefectural migration to equalize the income differentials. To evaluate the validity of this hypothsis, the following two analyses have been undertaken with respect to the interprefectural migration rate (INTERMR) and the prefectural income differential (INDIF), using Japanese data over the period 1955-1971 when interprefectural migration grew very rapidly. Note that INDIF represents the ratio of the average income in the five highest income prefectures to that in the five lowest income prefectures.[4/] One of the analytical results shows that the simple correlation between these two variables is 0.797. The other result, in which INTERMR has been regressed upon INDIF, is consistent with a priori expectations, as indicated below:

$$INTERMR_t = -5.271 + 15.441 \ INDIF_t$$
$$(1.68) \quad (3.02)$$

$$D - W = 0.534; \ R^{-2} = 0.611 \qquad (3)$$

These empirical results seem to support the above hypothesis.[5]

The pattern of interprefectural migration can also be analyzed on the basis of two regional classifications, namely, metropolitan areas and non-metropolitan areas. For illustrative purposes, the following ten prefectures are conventionally selected to constitute three major metropolitan areas: Tokyo, Kanagawa, Saitama, Chiba, Aichi, Gifu, Mie, Osaka, Kyoto, and Hyogo. The first three of these prefectures belong to the Tokyo metropolitan area, the next three to the Chukyo metropolitan area, and the last three to the Hanshin metropolitan area.

Among the four migration types under consideration, the share of migration from nonmetropolitan to metropolitan areas was the largest from 1954 to 1965, as displayed in Figure 1. In 1961, it recorded a peak value of 37.4%. Because the majority of these migratory streams are of the rural-urban nature, these changes in the percent distribution may be interpreted as largely reflecting the pace of off-farm migration.

As suggested by one of Ravenstein's laws of migration, such massive population movements from nonmetropolitan to metropolitan areas were accompanied by a steady rise in the volume of counterstreams from metropolitan to nonmetropolitan areas. The percent share of such counterstreams was lowest in the 1950s, but it increased steadily from 1960 to 1976. As discussed elsewhere, a considerable proportion of this type of internal migration was return migration, both U-turn and J-turn. In the last several years, however, the percent share of such population movements has been slowly shrinking in response to a decrease in migration from nonmetropolitan to metropolitan areas.

Approximately ten years after the peak of migration from nonmetropolitan to metropolitan areas, migration within metropolitan areas occupied the largest share, reaching its peak value of 32.7% in 1972. A substantial portion of the population movement within metropolitan areas involved moves from extremely populous central parts of the metropolitan areas to their less crowded peripheries, thus suburbanizing the latter.

Migration within nonmetropolitan areas shows a U-shaped trend, i.e., a gradual decrease from 24.4% in 1954 to 17.9% in 1971, and a slow recovery in the 1970s and 1980s. Because this type of migration

Figure 1. Percent Distribution of Four types of Interprefectural Migration, 1954-1983
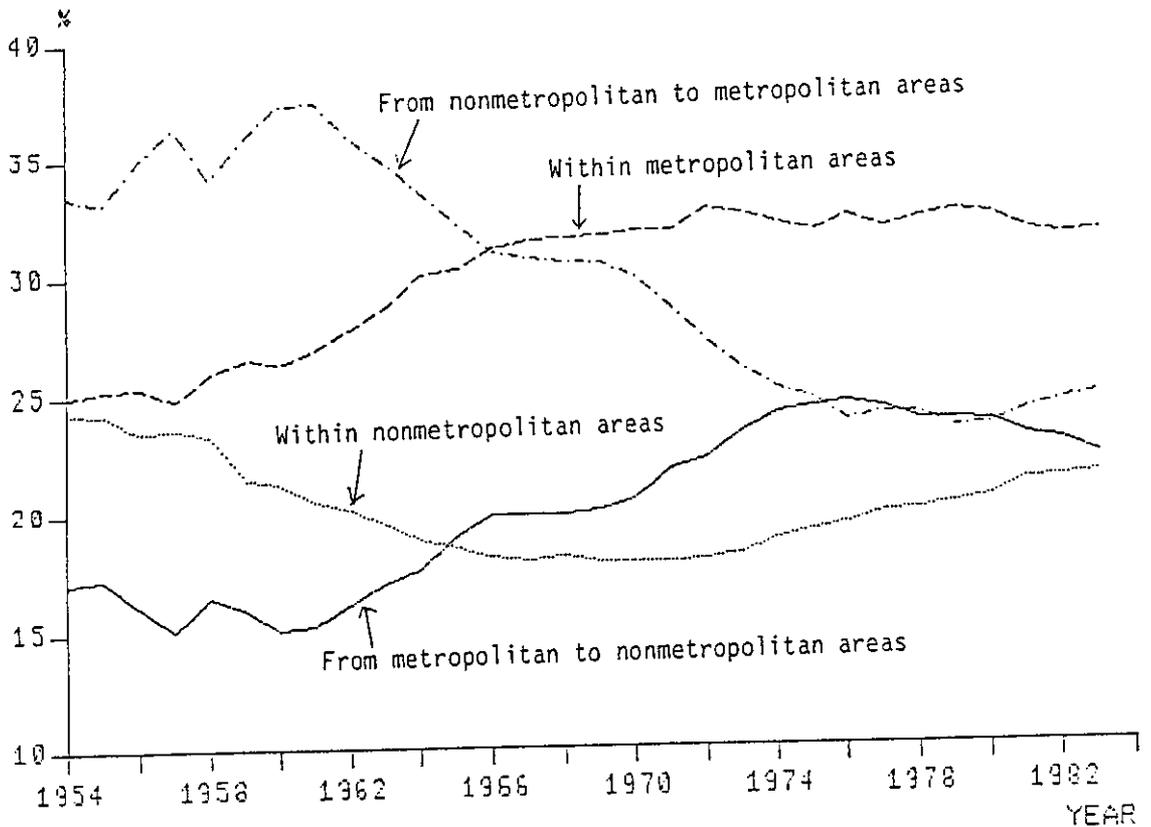
Source: Bureau of Statistics, Office of the Prime Minister, Migration Report Based on Resident Registration, various years.

involves multidirectional population movements among 37 prefectures, it is extremely difficult to relate these changes to macro-level economic activities. It has been demonstrated, however, by some of the previous studies that a considerable component of this type of migration is related to marriages and the availability of job opportunities in the nearest major cities, thus resulting in moves between neighboring prefectures.

It is also interesting to note that net in-migration from non-metropolitan to metropolitan areas shows pronounced pattern changes over the 30 year period. As shown in Figure 2, it was at a high level during the rapid economic growth period, and its peak was observed in 1961 with a total of 655,000 in-migrants. The peak for the Tokyo metropolitan area was 364,000 net in-migrants in 1962. One year before that, the Hanshin metropolitan area hit a peak with 221,000 net in-migrants, while the Chukyo metropolitan area had a total of 81,000 net in-migrants one year after that.

In the 1970s, however, all these metropoliltan areas experienced a drastic decline in the volume of net in-migration. Since 1973, the Hanshin metropolitan area has been continuously suffering negative net in-migration, although the magnitude of such a loss has been shrinking in the recent past. The Chukyo metropolitan area also recorded a negative volume of net in-migration over the period 1975-1980. Although the Tokyo metropolitan area has never undergone a net loss of in-migrants, the number of net in-migrants decreased to the low level of 26,000 in 1976. These changes in the three metropolitan areas may indicate a saturation of their population carrying capacity.

As is evident from Figure 1, however, these three metropolitan areas have once again been showing a gradual increase in the volume of net in-migrants in recent years. This upward trend might be partially induced by the increased availability of housing in the form of condominiums in the three metropolitan areas.[6] In any case, as new data become available, this newly-emerging pattern needs to be carefully assessed to determine whether it is temporary or the beginning of a new secular trend.

Data on net in-migration for each prefecture are also available in past population censuses. While the Migration Report Based on Resident Registration provides information on in- and out-migration for each prefecture on an annual basis, as discussed above, the

Figure 2. Number of Net In-migrants in Three Metropolitan Areas,
1954-1983
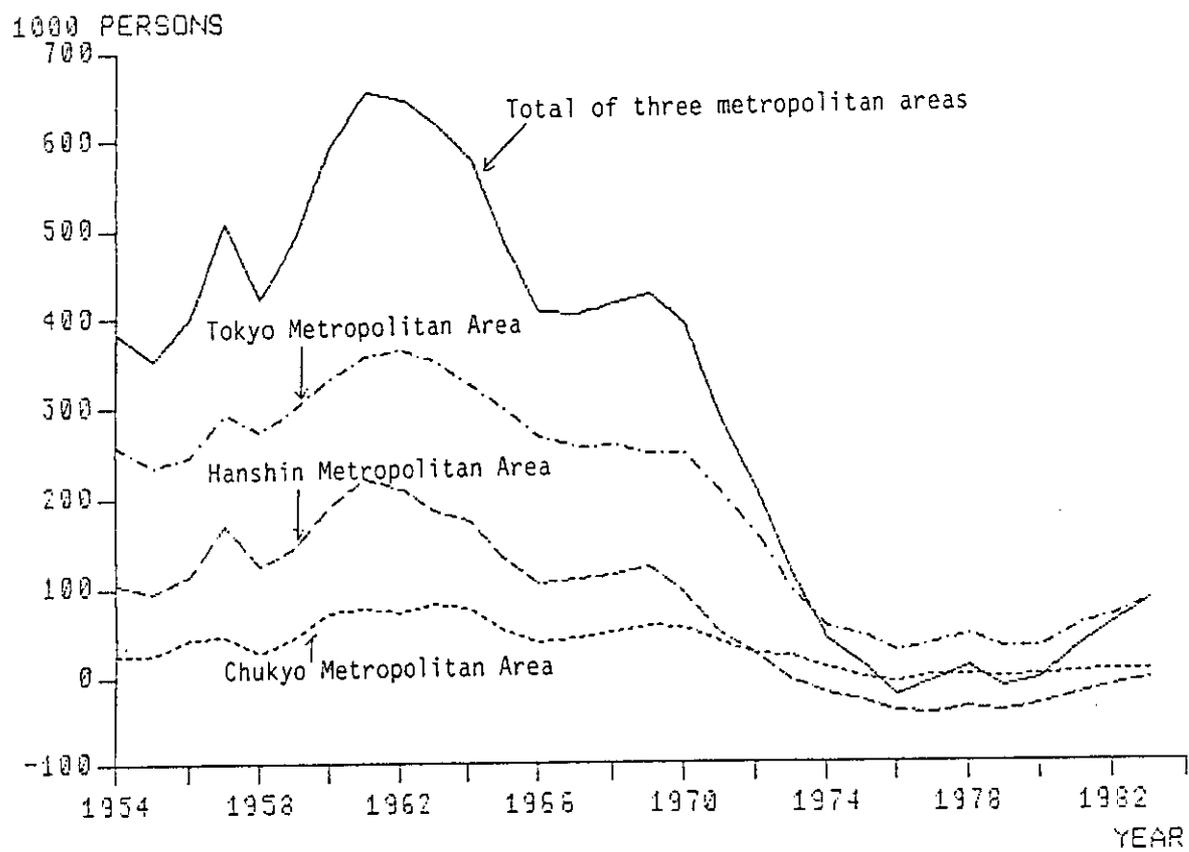
Source: Bureau of Statistics, Office of the Prime Minister,
Migration Report Based on Resident Registration,
various years.

censuses contain comparable information on intercensal migration. Table 3, prepared on the basis of the population censuses during the period 1955 to 1980, depicts those prefectures which are either major gainers or losers of population through migratory movements for each intercensal period.

Several points of interest emerge from this table. First of all, there is not one single prefecture which has consistently remained in the top five receiving or sending prefectures over the 25-year period. This seems to indicate that the pattern of migration has been changing very rapidly in postwar Japan.

Secondly, although the three most populous centers, Tokyo, Osaka, and Aichi, were included in the list of the five major receiving prefectures in the early part of the period in question, they were gradually eliminated from the list of receiving prefectures, and were added to the list of sending prefectures. In the last three inter-censal periods, Tokyo has been ranked first on the list of the five major losers of population. In the most recent intercensal period, both Osaka and Aichi were also listed as principal sending prefectures.

Thirdly, the prefectures adjacent to these three densely-populated prefectures have seen a fast rise in their ranks as receiving prefectures. These prefectures include Kanagawa, Saitama, Chiba, and Nara. This result is consistent with the pronounced increase in the percentage share of migration within metropolitan areas during the 1960s and 1970s, reflecting the phenomenon of suburbanization, as previously discussed.

Fourthly, it is important to note that although Ibaragi was one of the five major sending prefectures over the period 1955-1960, it was listed as one of the five major receiving prefectures in the most recent intercensal period. This dramatic shift in the net in-migration status for Ibaragi Prefecture is partly due to the improved transportation system connecting this prefecture with the Tokyo metropolitan area, which has, in turn, induced a massive influx of migrants from the latter to the former, especially for housing reasons.

Fifthly, one can note that primary industry-based prefectures in both the northern and southern parts of Japan, such as Fukushima, Hokkaido,[7/] Kumamoto, and Nagasaki, were the principal sending

Table 3. Number of Net In-migrants in Five Largest Receiving
Prefectures and Number of Net Out-migrants in Five
Largest Sending Prefectures in the Last Five Successive
Intercensal Periods

(Unit: 1,000 persons)

Rank	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980

Receiving Prefectures

Rank	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980
1	Tokyo (1164)	Osaka (710)	Kanagawa (625)	Saitama (560)	Chiba (337)
2	Osaka (624)	Kanagawa (709)	Saitama (571)	Chiba (487)	Saitama (289)
3	Kanagawa (347)	Tokyo (465)	Chiba (465)	Kanagawa (405)	Kanagawa (138)
4	Aichi (238)	Saitama (420)	Osaka (380)	Nara (87)	Ibaragi (107)
5	Hyogo (106)	Aichi (300)	Aichi (214)	Aichi (80)	Nara (84)

Sending Prefectures

Rank	1955-1960	1960-1965	1965-1970	1970-1975	1975-1980
1	Kagoshima (211)	Fukuoka (230)	Tokyo (305)	Tokyo (566)	Tokyo (576)
2	Fukushima (174)	Nagasaki (211)	Hokkaido (284)	Hokkaido (160)	Osaka (239)
3	Niigata (149)	Kagoshima (190)	Kagoshima (176)	Nagasaki (71)	Hyogo (78)
4	Kumamoto (145)	Hokkaido (178)	Nagasaki (145)	Niigata (70)	Nagasaki (41)
5	Ibaragi (121)	Fukushima (160)	Fukuoka (138)	Fukushima (59)	Aichi (37)

Source: Bureau of Statistics, Office of the Prime Minister,
Population Census of Japan, various years.

prefectures from 1955 to 1975. This pattern, however, became less pronounced over time.

Finally, although not shown in Table 3, it should be stressed that some prefectures, such as Miyagi and Fukuoka,[8] have recently been experiencing a substantial increase in net in-migration. One of the factors contributing to this phenomenon is aggravated external diseconomies resulting from overconcentration of the population in the three metropolitan areas. A second factor is that the infrastructure of these prefectures had improved considerably through the implementation of the two Comprehensive National Development Plans in the 1960s. Thirdly, regional autonomous bodies in these prefectures provided a variety of economic incentives such as tax exemption for businesses. Fourthly, starting from the early 1970s, most of the large-scale enterprises gradually shifted their business strategies from placing heavy emphasis upon a few major economic centers such as Tokyo and Osaka to establishing their own nation-wide commercial network systems in order to increase their market shares. Through the influence of these factors, the capital cities of these prefectures have become new regional focal points of various business activities, thus leading to the rapid growth of their populations.[9]

B. Population Redistribution and Development Plans

The six forementioned observations strongly support the notion of dramatic population redistribution accompanying sustained economic development. Table 4 presents the changing pattern of population distribution among 11 regional districts over the period 1950-1980. In 1980, 24.5% of the Japanese population lived in the Minami-Kanto District, 13.8% in the Nishi-Kinki District, and 11.4% in the Tokai District. These figures imply that approximately 50% of the total population reside in these three districts which respectively include Tokyo, Osaka, and Nagoya. Among these three, the Minami-Kanto District, the core of which is the Tokyo metropolitan area, has been increasing its proportion in the past 30 years at a faster rate than any other district; the percentage share for the Minami-Kanto District was 15.6% in 1950, but it rose to 24.5% in 1980.

Such a changing pattern of population distribution is reflected by a steady rise in the index of population concentration.[10] It was

Table 4. Changes in the Pattern of Population Distribution in 11 Districts, 1950-1980

(Unit: %)

District	1950	1955	1960	1965	1970	1975	1980
All Japan	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hokkaido	5.1	5.3	5.3	5.2	5.0	4.8	4.8
Tohoku	10.8	10.4	9.9	9.2	8.6	8.3	8.2
Kita-Kanto	6.2	5.8	5.5	5.2	5.1	5.2	5.3
Minami-Kanto	15.6	17.1	18.9	21.2	23.0	24.2	24.5
Hokuriku/Tosan	9.6	8.9	8.5	7.9	7.5	7.2	7.1
Tokai	10.6	10.5	10.7	11.0	11.3	11.4	11.4
Higashi-Kinki	3.1	2.9	2.8	2.7	2.7	2.8	2.9
Nishi-Kinki	10.7	11.3	12.1	13.2	13.9	14.0	13.8
Chugoku	8.1	7.8	7.3	6.9	6.7	6.6	6.5
Shikoku	5.0	4.7	4.4	4.0	3.7	3.6	3.6
Kyushu[a]	15.3	15.3	14.6	13.4	12.4	12.0	12.0

a/including Okinawa

Source: Bureau of Statistics, Office of the Prime Minister, Population Census of Japan, various years.

27.7 in 1950, 31.5 in 1960, 36.6 in 1970, and 38.0 in 1980. One can note that although the pattern of population distribution has been increasingly skewed in these successive decades, the pace of change, extremely rapid in the 1950s and 1960s, slowed down considerably in the 1970s. The pattern of these temporal changes in population concentration is highly comparable to that of the variation in the mobility rate as described in Table 1, suggesting that internal migration has been the principal source of both overcrowding in urban areas and depopulation in rural areas over the period in question.

To cope with such intensified imbalances in population distri-

bution, the Government of Japan implemented a series of development
plans in the 1960s and 1970s. In 1962, the government started the
Comprehensive National Development Plan in which the correction of
urban overcrowding was emphasized through the growth pole approach.
Despite this development plan, overconcentration of industry and
population in the major metropolitan areas was somehow further
intensified. In 1969, the government adopted the New Comprehensive
National Development Plan, aimed at the dispersion of industrial
development to local areas through large-scale development projects.
The chief target of this development plan was the achievement of
balanced coordinated development throughout Japan. In 1977, the Third
Comprehensive National Development Plan was implemented. This
development plan, designed to establish "human habitation zones", may
be described as a typical policy of population dispersion through
migration.[11]

Although these three development plans appear to have mitigated
population distributional imbalances to a certain degree, it is
desirable that more effective strategies for rectifying population
distribution be formulated in the Fourth Comprehensive Development
Plan, which is presently under deliberation.

C. Characteristics of the Migrants

Let us now discuss some of the demographic characteristics of the
migrants. Table 5 presents the mobility rate by age and sex as
observed for 12 months prior to the 1970 and the 1980 censuses. As
regards the overall mobility rates, males were slightly more mobile
than females in both 1970 and 1980. There are, however, considerable
differentials in mobility among various age groups. In both years,
males and females are highly mobile at ages 20-24 and 25-29. For
males, the most mobile age group is 25-29 in 1970, but it is the age
group 20-24 in 1980. For females, the most mobile age group is 20-24
in both years. For both sexes, the age groups 15-19 and 30-34 also
show a high propensity to migrate. Because these four highly mobile
age groups are at reproductive stages, the mobility rates for infants
and toddlers are also high. Among older age groups, however, the
mobility rates are considerably lower when compared with those for
younger age groups.

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Table 5. Age-selectivity of Migrants by Sex in 1970 and 1980

(Unit: %)

Age	1970		1980	
	Males	Females	Males	Females
All Ages	12.8	11.2	10.1	9.1
0	9.9	9.8	13.5	13.5
1- 4	13.6	13.6	12.0	12.0
5- 9	8.9	9.0	8.6	8.7
10-14	6.1	6.2	6.1	6.2
15-19	17.5	15.1	13.4	11.6
20-24	23.4	24.0	20.0	20.3
25-29	24.7	21.5	19.0	19.0
30-34	17.1	12.7	14.2	11.9
35-39	11.3	8.8	10.1	8.2
40-44	8.6	6.8	7.5	5.7
45-49	7.5	5.8	5.9	4.6
50-54	6.5	5.2	5.1	4.1
55-59	5.7	4.6	4.4	3.7
60-64	4.5	4.4	3.6	3.7
65-69	3.9	4.3	3.5	3.8
70-74	3.7	4.3	3.7	4.3
75-79	3.5	4.2	3.9	4.8
80-84	3.4	4.0	4.2	5.0
85+	3.5	3.7	4.3	4.7

Source: Bureau of Statistics, Office of the Prime Minister,
Population Census of Japan, 1970 and 1980.

From 1970 to 1980, the overall mobility rates for both sexes
diminished slightly. However, the basic pattern of age selectivity of
the migrants is quite comparable for these two observation years
except for a few age groups. It should be further noted that the age-
specific difference in the mobility rates between these two years is
relatively more pronounced among the highly mobile age groups.   It is
also worth remarking that the mobility rates for older age groups,
particularly 75 years old and older, increased appreciably from 1970
to 1980.[12/]

        As displayed in Table 6, the age-specific mobility rate for each
sex can be further examined in terms of intra- and interprefectural

Table 6. Age-selectivity of Migrants by Sex and Type of Migration
in 1970 and 1980

(Unit: %)

Age	1970		1980	
	Males	Females	Males	Females

Intraprefectural Migration

Age	Males	Females	Males	Females
All Ages	8.6	8.0	7.0	6.8
0	7.6	7.6	11.6	11.6
1 - 4	10.1	10.1	9.0	9.0
5 - 9	6.7	6.7	6.5	6.5
10 - 14	4.8	4.8	4.8	4.8
15 - 19	8.7	8.6	6.9	7.0
20 - 24	13.7	16.7	12.0	14.9
25 - 29	17.7	15.6	13.5	14.0
30 - 34	12.3	9.4	10.4	8.8
35 - 39	7.9	6.7	7.3	6.2
40 - 44	6.0	5.3	5.4	4.5
45 - 49	5.2	4.6	4.2	3.7
50 - 54	4.7	4.1	3.7	3.3
55 - 59	4.2	3.6	3.3	3.0
60 - 64	3.4	3.3	2.8	3.0
65 - 69	3.1	3.4	2.8	3.1
70 - 74	3.0	3.4	3.1	3.5
75 - 79	2.9	3.3	3.3	4.0
80 - 84	2.8	3.2	3.6	4.3
85+	2.8	2.9	3.6	4.1

Interprefectural Migration

| Age	Males	Females	Males	Females
All Ages	4.2	3.1	3.0	2.2
0	2.2	2.2	1.9	1.9
1 - 4	3.5	3.5	3.0	3.0
5 - 9	2.2	2.2	2.1	2.1
10 - 14	1.4	1.4	1.3	1.3
15 - 19	8.8	6.5	6.5	4.6
20 - 24	9.6	7.2	8.0	5.4
25 - 29	7.0	5.9	5.4	4.8
30 - 34	4.8	3.3	3.7	3.0
35 - 39	3.3	2.1	2.8	2.0
40 - 44	2.6	1.5	2.1	1.1
45 - 49	2.3	1.2	1.6	0.8
50 - 54	1.9	1.0	1.3	0.8
55 - 59	1.5	1.0	1.1	0.7
60 - 64	1.1	1.0	0.8	0.7
65 - 69	0.8	1.0	0.7	0.8
70 - 74	0.7	1.0	0.6	0.8
75 - 79	0.6	0.9	0.6	0.8
80 - 84	0.6	0.8	0.6	0.8
85+	0.7	0.7	0.6	0.7

Source: Same as Table 5.

migration. As regards intraprefectural migration, the most mobile age group for males is 25-29, while that for females is 20-24. This applies to both 1970 and 1980. In addition to these age groups, those aged 0-4 show a high propensity to migrate. These age-specific mobility patterns appear to suggest that a considerable part of intraprefectural migration involves household moves for housing purposes.

Insofar as interprefectural migration is concerned, however, the age group 20-24 shows the highest mobility rate for both sexes in both years. The other age groups adjacent or close to this age group are also highly mobile for both sexes. (The factors contributing to the high interprefectural mobility of these age groups are discussed in the next section.)

Let us now analyze the sex composition of the migrants. Although no significant pattern of sex-selectivity can be observed in terms of total migration as indicated by Table 5, the pattern of the sex ratio of the migrants classified by distance reveals large differences. Figure 3 illustrates the changing pattern of the sex ratios for both interprefectural and intraprefectural streams over the period 1959-1983.[13/] In the case of interprefectural transfers involving long distance movements, male migrants consistently surpassed female migrants by a 20 to 30 percent margin. In contrast, the sex ratio for intraprefectural migration was relatively balanced throughout the entire observation period.

Figure 4 compares changes in the sex ratios of interprefectural migrants by type of migration over the period 1959-1983. One can observe that each type of interprefectural migration shows considerable fluctuations over time. From 1959 to the early part of the 1960s, the sex ratios for all the four migratory types increased to a large extent. From 1959 to 1962, the migratory stream within metropolitan areas had the most imbalanced sex ratio. From 1963 to 1973, however, metropolitan-nonmetropolitan migration showed the most skewed sex ratio, and migration within nonmetropolitan areas underwent the most pronounced sex imbalance over the period 1974-1983. In contrast to these three types of interprefectural migration, the population movement from nonmetropolitan to metropolitan areas had a relatively low sex ratio ranging from 1.13 to 1.20 over the period 1964-1978. The largest difference in the sex ratios was observed in 1965 when the population flow from metropolitan to nonmetropolitan

Figure 3. Changes in the Sex Ratio of Migrants by Type of
          Migration, 1959-1983
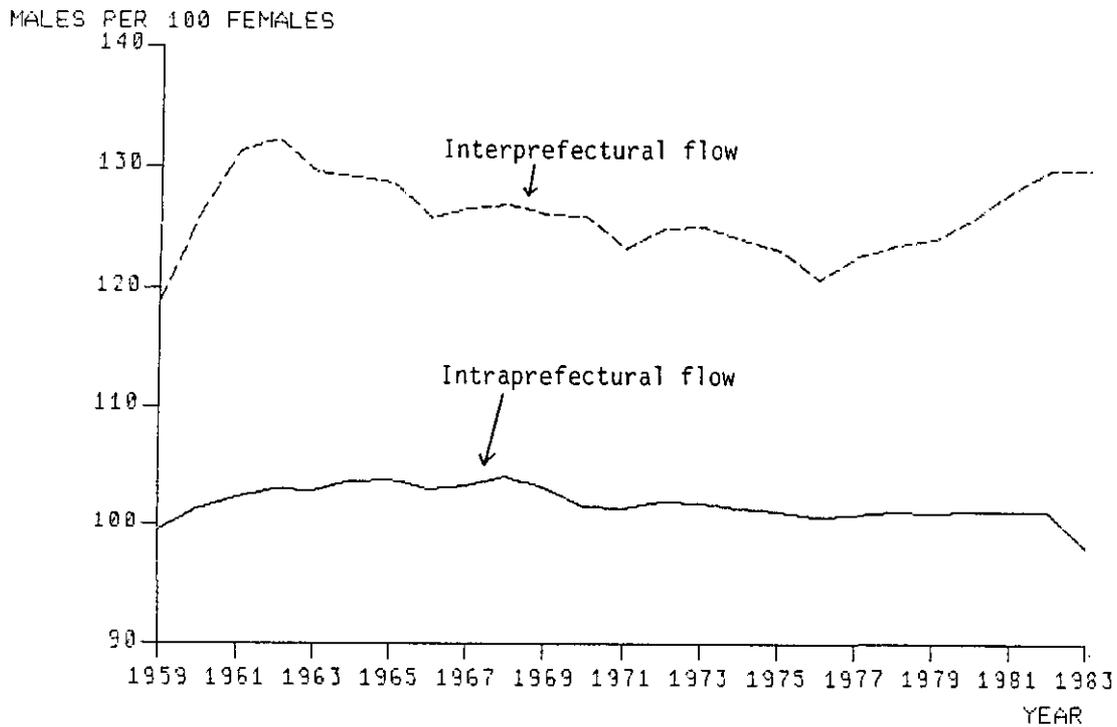
MALES PER 100 FEMALES

Figure 4.   Changes   in   the Sex Ratio of Migrants by Four   Types   of
Interprefectural Migration, 1959-1983
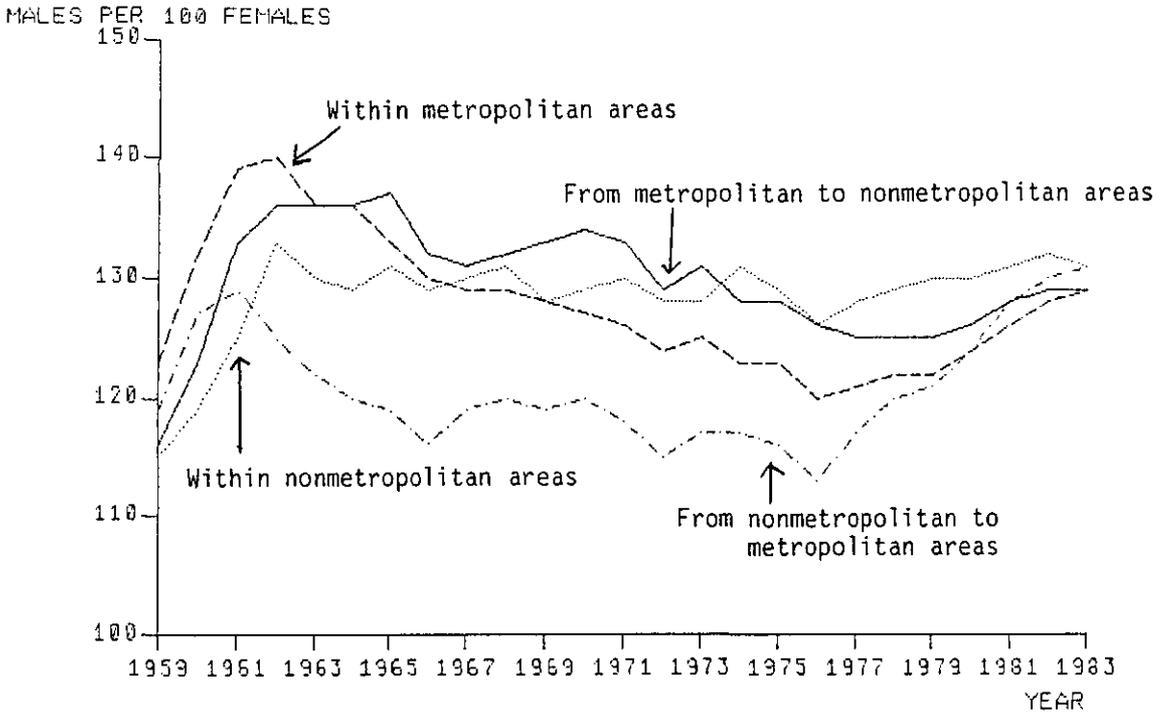
MALES PER 100 FEMALES

Source: Bureau of Statistics, Office of the Prime Minister,
Migration Report Based on Resident Registration,
various years.

areas had a sex ratio of 1.37 and the opposite flow recorded 1.19. In the most recent five years, however, migration from nonmetropolitan to metropolitan areas has increased its sex ratio, thus narrowing the difference in the sex ratios of the four migratory streams. In view of these inter-temporal changes and the pattern of overall mobility, as discussed earlier, one may hypothesize that the differentials in the sex ratios of various migratory streams tend to expand when overall mobility increases, and vice versa.

III. Determinants of Internal Migration

This section deals with an analysis of the determinants of inter-prefectural migration, using the 1970 and 1980 censuses. The reason for focusing attention upon interprefectural rather than intra-prefectural migration is that the former seems more significant in relation to economic development, as shown above. Another reason is the paucity of data required for analyzing the determinants of the latter.

As compared with research on the determinants of either fertility or mortalilty, only a limited number of studies have been undertaken with regard to the determinants of migration in Japan. Most of these studies on the determinants of migration focused on the determinants at the macro level rather than at the micro level. Before proceeding to our analysis of the determinants of interprefectural migration, it would be useful to review some of the important studies conducted with regard to this area in Japan.

A. Review of Previous Studies

During the period 1955 to 1965, two major studies on the determinants of migration were undertaken. The main objective of these two studies was to analyze the determinants of off-farm migration. In 1956, Namiki attempted to examine the pattern of off-farm migration over the period 1920-1935, drawing upon data derived from population censuses and vital registration. The study by Namiki demonstrated that the off-farm migration observed during this period occurred as a result of the high natural increase of the farm population rather than as a result of the employment creation effect in urban, nonagricul-

tural sectors.

In 1962, however, Minami and Ono found the opposite pattern in their study, which covered the longer time period from 1925 to 1960. They showed that there was a strong positive relationship between the volume of off-farm migration and the availability of job opportunities in industrial sectors, thus indicating the predominance of urban pull factors over rural push factors.

Following these two studies, Tachi and Koyama, primarily using population census data, looked at the determinants of interprefectural migration over the period 1948-1957. One of their principal findings was that income differentials between origin and destination areas, rather than differences in job opportunities, accounted for the flow of such long distance movements. The Tachi-Koyama study implies that people move to increase their earnings rather than simply to secure jobs, contrary to the "job vacancies thesis" which tends to be borne out in developing countries.

In the recent past, Okazaki attempted to identify the determinants of interprefectural in- and out-migration rates by utilizing both the 1970 and 1980 censuses together with prefecture-specific socio-economic indicators for the corresponding years. He concluded that both in- and out-migration rates were strongly correlated with the output share by industry, per capita prefectural income, the number of universities per 100,000 population, and average earnings. He also found that these results were, by and large, comparable between these two years. It should be noted, however, that these conclusions were based upon the results of simple correlations. Because the socio-economic variables included in the study are closely related with each other, more advanced statistical treatments are needed to identify the net effect of each variable upon the observed in- and out-migration patterns.

Apart from these macro-level research studies on the determinants of migration, Otomo attempted to examine the determinants of household migration, utilizing the Migration Survey conducted by the National Land Agency in 1981. A series of cross-tabulations of this survey with a sample size of 7,000 households revealed that only 39% of total migration occurring from July 1980 to June 1981 (including both short and long distance movements), was due to economic motives. The remaining 61% resulted from noneconomic motives such as marriage,

housing, and education.

B. Determinants of Recent Interprefectural Migration

The studies reviewed above seem to suggest that the determinants of internal migration vary with types of movement as well as with stages of economic development. In the remainder of this section, therefore, we will examine the determinants of migration with special reference to interprefectural transfers, using the 1970 and 1980 population censuses. The published reports for these two censuses contain detailed information on interprefectural migration occurred in the last 12 months prior to the data of census enumeration. By drawing upon such data, this analysis focuses upon the identification of the determinants for the two migration-prone age groups, 15-24 and 25-34, as well as 15-34.

The dependent variable is the number of migrants per 1,000 population in prefecture i from prefecture i to prefecture j for each of these age groups during the past 12 months.[14/] The gross migration rate for the age group 15-24 is expressed as "MR1524," that for 25-34, "MR2534," and that for 15-34, "MR1534." These age-specific gross migration rates have been considered separately for males, females, and both sexes. For the sake of convenience, M has been attached to the beginning of each dependent variable for males, F for females, and B for both sexes.

To account for the variance in the gross migration rate for each age-sex group, the following eight explanatory variables have been considered: (i) distance between the prefectural capital at origin and that at destination (DISTANCE), (ii) regular monthly earnings adjusted by the unemployment rate (EXWAGE), (iii) annual change in the percentage share of the labor force engaged in both secondary and tertiary industries (EMP), (iv) number of housing units per person (HOUSING), (v) proportion of those living in urban areas, (URB) (vi) proportion of those with more than high school education to those aged 15 and over except for those attending schools (ATTAIN), (vii) ratio of those enrolled in the first year of colleges and vocational schools to those graduating from high schools (EDUC), and (viii) sex ratio at marriageable ages (SXRATIO).

The data on EXWAGE, EMP, and ATTAIN have been gathered on an age-

sex-specific basis, while those on HOUSING, and URB refer to the average values of the total population in each prefecture. EDUC is the variable applicable only to the age group 15-24, and SXRATIO has been employed only in the regression analysis for females. As regards the measurement of SXRATIO, it is the ratio of females aged 15-24 to males aged 20-29 for the age group 15-24, but for those at ages 25-34, it represents the ratio of females aged 25-34 to males aged 30-39. In the case of the age group 15-34, it indicates the ratio of females aged 20-29 to males aged 25-34. It should also be noted that the variable, EMP, represents the average annual change in the percentage share of the labor force in both secondary and tertiary industries during the intercensal period: 1965-1970 for the 1970 data set and 1975-1980 for the 1980 data set.[15/]

Caution should also be exercised with regard to the timing which each explanatory variable represents. The data on EXWAGE, HOUSING, and EDUC refer to time approximately six months before the date of each census,[16/] while the timing of data on URB, ATTAIN, and SXRATIO coincides with the census date. As discussed widely in the literature,[17/] there tend to exist numerous problems on the causal relationship between migration and explanatory variables. For this reason, these differences in the timing of each data should be borne in mind when regression results are interpreted.

In the regression analysis, all the explanatory variables except DISTANCE have been included as a difference between original and destination areas, i.e., subtracting the value at origin from that at destination.[18/] In terms of notation, each of the explanatory variables expressed in the form of differences is denoted by attaching D to the begining of its variable name.

Before analyzing the computational results, let us discuss the rationale for the inclusion of each explanatory variable in the regressions. As suggested by a gravity type model of gross migration, DISTANCE serves as a proxy for both the transportation and psychic costs to be incurred. A longer distance implies higher costs, thus lowering the probability of movement. DISTANCE is also negatively related to the availability of information concerning alternative localities; migration decreases with distance due to a decrease in information and an increase in uncertainties.

As exemplified by Tachi's collaborative work with Koyama, the

income that individuals expect to earn at each alternative destination is likely to play an important role in making their decisions to migrate. Although the relevant income measure for potential migrants to consider is the present discounted value of their future stream of net returns, current earnings has been used in the present analysis as a proxy for such expected future earnings. Moreover, to allow for the probability that the potential migrants may be reemployed immediately in receiving areas, current earnings differentials between origin and destination areas have been adjusted by differentials in unemployment rate in these two localities.[19] Hence, the larger DEXWAGE, the higher the probability of migration.

Besides income opportunities, the potential migrants are likely to base their migration decisions on a comparison of regional employment opportunities. According to the job vacancies thesis, workers are primarily responsive to job openings and not to wage differentials. Because it can be argued that where employment is expanding, vacancies are also expanding, DEMP is expected to be positively related to the gross migration rate.

As discussed in the previous section, the availability of housing is considered to play an essential role in the determination of migration in a populous country like Japan. To capture this phenomenon, DHOUSING has been included in the regression analysis. Furthermore, because there are still considerable rural-urban differentials in the accessibility to modern facilities such as advanced medical services, DURB is expected to account for differentials in migration due to the differential availability of amenities between origin and destination areas.

As evidenced by numerous migration studies,[20] the better educated are inclined to be more mobile than the less educated. This is partly because employment information is expected to increase with higher education, and partly because education may reduce the importance of tradition and family ties. It can be hypothesized, therefore, that the larger the interprefectural differentials in human capital stock (DATTAIN), the higher the incidence of interprefectural migration. Also, education is one of the principal motives for moving among young persons. DEDUC is expected to be an indicator of differentials in the availability of higher educational institutions between sending and receiving prefectures.

As discussed earlier, marriages are one of the major reasons for migration among young woman.[21] In a paternalistic society like Japan, it is usually females at marriageable ages who move to places where their prospective mates reside. If there is a pronounced difference in the sex ratio at marriageable ages among prefectures, part of interprefectural migratory flow is likely to be explained by DSXRATIO.

In the regression analysis, DEXWAGE, DEMP, DHOUSING, DURB, and DEDUC are expected to have positive coefficients, while DISTANCE, DATTAIN, and DSXRATIO have negative ones. Table 7 summarizes the regression results for 1980. First of all, let us analyze the results for the age group 15-34. Among the eight explanatory variables, distance (DISTANCE), the level of urbanization (DURB), per capita housing availability (DHOUSING), and educational opportunities (DEDUC) are the ones consistently showing correct signs and being statistically significant for the three sex cases. This implies that regardless of their sexes, the contemporary Japanese people in this age group would tend to migrate across prefectural boundaries if it was a relatively short distance from origin to destination, if receiving localities were better equipped with modern amenities than sending localities, if their intended destination areas had greater availability of housing than their origin areas, and if more educational opportunities were available in receiving prefectures than in sending prefectures.

Concerning wage differentials, all the estimated coefficients for the three sex cases of this age group conform well to _a priori_ expectations. It should be stressed, however, that it is only the male case in which DEXWAGE is statistically significant. Moreover, although DEMP, DATTAIN, and DSXRATIO have been included in the regressions, none of them have shown any significant correlation with the variance in the migration rates for the three cases.

We now turn to examine the estimated results for each disaggre-gated age group. For both age groups (15-24 and 25-34), the computed results are basically comparable to those for the age group 15-34, .except the following three aspects. First, wage differentials are an important motive for not only males but also females aged 25-34. Second, the growth of employment opportunities in the secondary and tertiary industries plays a significant role in the decision-making

Table 7. Regression Results on the Determinants of Interprefectural Migration for Selected Age-Sex-Specific Groups in Japan, 1980

Dependent variable	DISTANCE	DEXWAGE	DEMP	DHOUSING	DURB	DATTAIN	DEDUC	DSXRATIO	INTERCEPT	$\bar{R}^2$
Age group 15-34										
BMR1534	-0.0132** (0.001)	0.0031 (0.002)	0.0748 (0.059)	2.3111* (0.949)	0.0069** (0.002)	-0.0003 (0.003)	0.0049** (0.001)	-0.6825 (0.414)	0.9855** (0.038)	0.201
MMR1534	-0.0151** (0.001)	0.0047** (0.002)	0.1170 (0.080)	2.0031* (1.022)	0.0076** (0.002)	0.0047 (0.004)	0.0045** (0.001)		1.1539** (0.044)	0.212
FMR1534	-0.0113** (0.001)	0.0056 (0.003)	0.0446 (0.043)	2.1584* (0.853)	0.0085** (0.002)	-0.0024 (0.003)	0.0034** (0.001)	-0.3906 (0.384)	0.8329** (0.034)	0.182
Age group 15-24										
BMR1524	-0.0381** (0.003)	0.0158 (0.010)	0.0817 (0.159)	8.7092** (3.149)	0.0256** (0.007)	0.0024 (0.013)	0.0264** (0.002)	-3.8716** (0.937)	2.9425** (0.131)	0.285
MMR1524	-0.0439** (0.004)	0.0267** (0.009)	0.3839* (0.155)	7.8135* (3.565)	0.0384** (0.007)	0.0013 (0.013)	0.0294** (0.002)		3.4492** (0.149)	0.297
FMR1524	-0.0325** (0.003)	0.0143 (0.011)	0.0278 (0.148)	8.2502** (2.754)	0.0269** (0.006)	-0.0036 (0.012)	0.0227** (0.002)	-3.9288** (0.813)	2.4496** (0.119)	0.250
Age group 25-34										
BMR2534	-0.0199** (0.001)	0.0046* (0.002)	0.1444 (0.085)	3.5452* (1.479)	0.0168** (0.003)	0.0041 (0.006)		-0.3517 (0.549)	1.4524** (0.058)	0.144
MMR2534	-0.0206** (0.001)	0.0049** (0.002)	0.1583 (0.108)	3.9429** (1.350)	0.0157** (0.003)	0.0100 (0.006)			1.5242** (0.062)	0.139
FMR2534	-0.0192** (0.001)	0.0106** (0.004)	0.0897 (0.055)	2.1648 (1.445)	0.0166** (0.003)	-0.0022 (0.005)		0.0689 (0.530)	1.3811** (0.055)	0.150

Number of observations = 2162. Standard error in the parentheses.
* Significant at the 5% level. ** Significant at the 1% level.

process of the male migrants at ages 15-24. Third, an imbalance in the sex ratio at marriageable ages is a crucial factor for the migration of young females aged 15-24.

These regression results based upon the 1980 data set suggest that the migration determinants of the contemporary Japanese differ considerably with age and sex. For instance, the wage differences model is useful in explaining interprefectural migration mainly among males, while the job vacancies thesis has been supported only among young males. Although these economic considerations are important only for certain age or sex groups, noneconomic factors related to the availability of housing and urban amenities play a key role in the determination of migration regardless of the migrant's character-istics. Among other noneconomic factors, educational and marriage opportunities are essential factors for young migrants. Besides these noneconomic factors, distance is a crucial determinant for recent migrants apart from their personal qualifications.

Many of these observations for 1980 are applicable to the regression results for 1970 presented in Table 8.[22] There are, however, pronounced differences with regard to a few variables. The most marked and important difference is that housing was not a vital factor to account for interprefectural migration observed during the 12 months prior to the 1970 Population Census. This result seems to suggest that migration for housing purposes during this time period was primarily of the intraprefectural type rather than of the interprefectural type. The validity of this view is substantially supported by the following two pieces of information. First of all, in 1970, there was still considerable space left for housing construction even in the most populous part of major cities. Let us take Tokyo for instance. The proportion of the Densely Inhabited Districts (DIDs)[23] in Tokyo's 23 wards, as measured in terms of area was 88.8% in 1965 and 95.2% in 1970. Over the period 1975-1980, however, the proportion increased from 99.3% to 100%. These intertemporal changes indicate that land for constructing new housing units in the central part of Tokyo virtually disappeared in the latter half of the 1970s, consequently inducing a rise in migratory streams to the neighboring prefectures for housing needs. Secondly, as displayed in Appendix II, the regression results based on a subsample of the 1970 data for the ten prefectures belonging to the

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Table 8. Regression Results on the Determinants of Interprefectural Migration for Selected Age-Sex-Specific Groups in Japan, 1970

Dependent variable	DISTANCE	DEXWAGE	DEMP	DHOUSING	DURB	DATTAIN	DEDUC	DSXRATIO	INTERCEPT	$\overline{R}^2$
Age group 15-34										
BMR1534	-0.0212** (0.002)	0.0011 (0.006)	-0.2818** (0.098)	0.7121 (1.184)	0.0127** (0.004)	0.0122* (0.005)	0.0073** (0.002)	-2.0647** (0.378)	1.4653** (0.064)	0.253
MMR1534	-0.0234** (0.002)	0.0126* (0.005)	-0.0761 (0.105)	-0.5824 (1.285)	0.0237** (0.004)	0.0137* (0.006)	0.0086** (0.002)		1.6574** (0.071)	0.250
FMR1534	-0.0192** (0.002)	0.0130 (0.012)	-0.1242** (0.047)	0.6226 (1.080)	0.0150** (0.003)	0.0046 (0.004)	0.0070** (0.001)	-1.2772** (0.337)	1.2847** (0.058)	0.238
Age group 15-24										
BMR1524	-0.0524** (0.005)	0.0423 (0.062)	0.0261 (0.182)	3.1999 (3.908)	0.0647** (0.012)	-0.0165 (0.016)	0.0438** (0.005)	-1.8082 (1.245)	3.9016** (0.202)	0.295
MMR1524	-0.0583** (0.006)	0.0638 (0.035)	-0.3221 (0.404)	1.4569 (4.142)	0.0877** (0.012)	0.0254 (0.018)	0.0573** (0.005)		4.4690** (0.223)	0.310
FMR1524	-0.0469** (0.005)	0.1329* (0.052)	0.4146* (0.211)	3.8261 (3.579)	0.0630** (0.011)	0.0023 (0.013)	0.0364** (0.004)	-0.8731 (0.840)	3.3775** (0.188)	0.266
Age group 25-34										
BMR2534	-0.0315** (0.002)	0.0183** (0.007)	-0.2318** (0.089)	-0.1692 (1.599)	0.0306** (0.005)	0.0059 (0.006)		-2.1774 (1.223)	2.0523** (0.087)	0.194
MMR2534	-0.0336** (0.002)	0.0276** (0.008)	-0.0011 (0.002)	-0.0667 (1.740)	0.0366** (0.004)	0.0080 (0.007)			2.2361** (0.096)	0.186
FMR2534	-0.0294** (0.002)	0.0319** (0.010)	-0.1894** (0.060)	-0.3044 (1.527)	0.0271** (0.005)	0.0021 (0.005)		-1.1317 (1.061)	1.8767** (0.081)	0.198

Number of observations = 2070. Standard error in the parentheses.
* Significant at the 5% level. ** Significant at the 1% level.

three metropolitan areas have shown that the housing factor had no significant effect on interprefectural migratory streams within these areas, thus reinforcing the view that housing was not a vital factor in interprefectural migration.

The other main difference between the 1970 and 1980 results is that the coefficients for DEMP and DATTAIN in a few regressions for 1970 have been statistically significant, but with wrong signs. These results appear to be partially reflective of the effect of the two Comprehensive National Development Plans implemented during the 1960s upon the pattern of interprefectural migratory flow; through these growth pole-oriented development plans, many business firms sent their educated workers from urban centers to their newly-constructed factories located in rural areas during the rapid economic growth period. It should be noted, however, that the estimated coefficient of DEMP for the female migrants aged 15-24 has conformed to _a priori_ expectation, thus supporting the applicability of the job vacancies model to this group.

Another difference can be observed with regard to the estimated coefficients for DEXWAGE and DSXRATIO. Although the 1980 results have supported the applicability of the wage differences model mainly to the male migrants, the 1970 regressions have yielded mixed results. For the age group 15-34, for example, the wage differences model has been applicable to the male migrants, but for the age group 15-24 it has been supported by the female migrants. As regards DSXRATIO, its estimated coefficient has been statistically significant for the age group 15-24 in the case of the 1980 data, but the 1970 estimated results show that it is the age group 15-34 for which the coefficient is statistically significant.

These intertemporal differences in the regression results seem to suggest that the determinants of interprefectural migration in Japan have substantially varied between the rapid growth period and the stable growth period, and have been partially influenced by the nature of development plans adopted by the government.

IV. Off-Farm Migration and Economic Development

As discussed in the previous section, a few earlier studies dealt with an analysis of rural-urban migration in relation to Japan's

Figure 5. Exposition of the Harris-Todaro Model
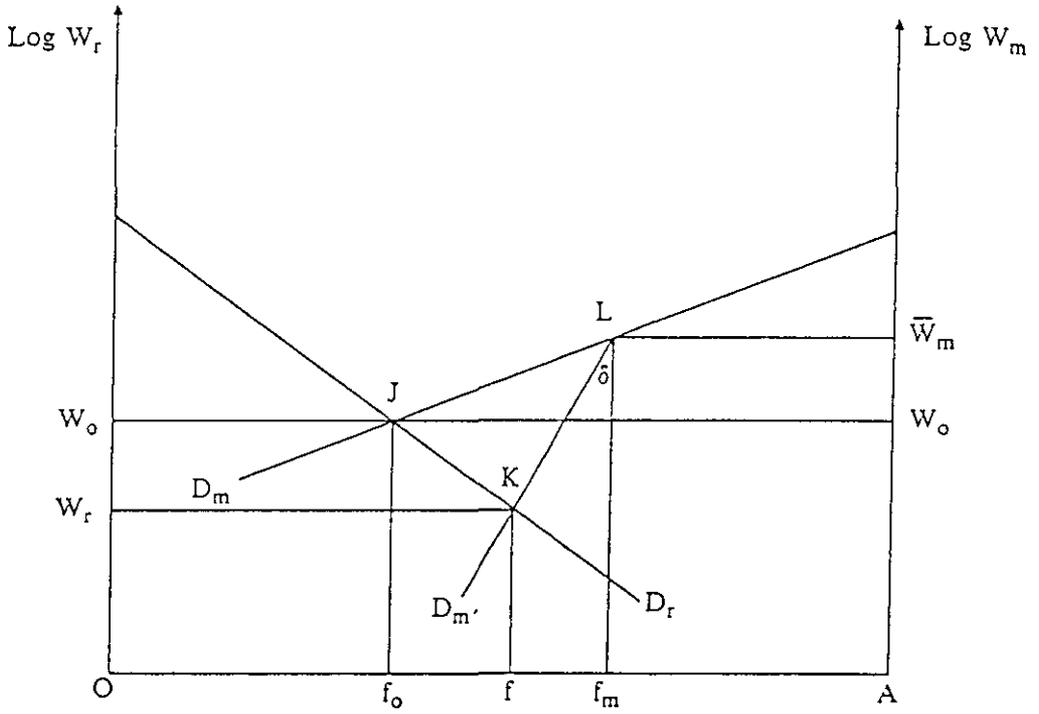
economic development.   It is, however, only the Minami-Ono study that covered the postwar period as part of their long-term time-series analysis.   It is also important to note that Minami and Ono referred to the period only up to 1960, before the volume of such migration increased to a pronounced extent.   In addition, their study primarily examined the association between rural-urban sectoral flows and industrial economic growth, thus failing to shed light upon the interactive process of human mobility between rural agricultural and urban nonagricultural sectors.   This section, therefore, attempts to clarify the basic interactive mechanism of rural-urban migration in Japan's development context over the recent three decades by drawing upon a two-sector migration model developed by Harris and Todaro.

In his recent work, Suits adapted the Harris-Todaro model to explain U.S. rural-urban migration over the period 1900-1976.   In his adaptation of the model, he formulated a system of five structural equations, capturing the essence of the Harris-Todaro model, and delivered a reduced form by focusing the analysis upon a temporal change in the proportion of the labor force in agriculture.   His reduced form equation can be expressed as follows:

$$f = f(P_F, P_{NF}, u) \tag{4}$$

where f = fraction of labor force engaged in agriculture,

P_F = average output per worker-hour of farm work,

P_{NF} = average output per worker-hour of nonfarm work, and

u = unemployment rate in nonagriculture.

Caution should be exercised in two respects, however, with regard to this equation.   First, the value of average productivity has been employed, rather than that of marginal productivity.   This substitution seems to do little violence to the theory in that "by a familiar property of the Cobb-Douglas production function, (unobservable) marginal productivity is proportional to (observed) average productivity".   Second, unlike the standard Harris-Todaro model, the unemployment rate is treated as an exogenous variable rather than an endogenous one.   This adaptation has been made primarily because the main source of changes in U.S. unemployment is not rural-urban migration but an interplay of such factors as fiscal

and monetary policies, consumer expectations, and investment opportunities. Hence, this adapted version of the Harris-Todaro model is particularly applicable to developed societies.

The behavioral equation for empirical testing can be expressed as follows:

$$\text{Ln } f_t = a_0 + a_1 \text{ Ln } P_{Ft} + a_2 \text{ ln } EP_{NFt} + e_t \tag{5}$$

where EP_{NFt} stands for the expected value of nonagricultural labor productivity when the nonagricultural unemployment is taken into account. Because rising productivity in either sector reduces the proportion of the labor force in agriculture, both a_1 and a_2 are expected to have a negative sign.

When equation (5) is fitted to the Japanese data over the period 1953-1982, the result is:

$$\text{Ln } f_t = 0.8639 - 0.4221 \text{ Ln } P_{Ft} - 0.5877 \text{ Ln } EP_{NFt}$$
$$\quad\quad (0.202) \quad (0.131) \quad\quad\quad (0.144)$$

$$\text{D-W} = 0.322; \ \overline{R}^2 = 0.987 \tag{6}$$

The result conforms quite well with _a priori_ expectations. That is, productivity improvements (in both agricultural and nonagricultural sectors), contribute to a decline in the proportion of the labor force required in the agricultural sector.

It is important to observe that the difference in the values of the two estimated coefficients is considerable. This implies that if the same amount of labor productivity growth occurred in both sectors, productivity growth in the nonagricultural sector would affect sectoral labor allocation much more than that in the agricultural sector. In fact, over the sample period, average productivity per worker in each sector increased to a highly comparable degree (4.1 times for the agricultural sector and 4.5 times for the nonagricultural sector), so we can conclude that the "pull" mechanism in the nonagricultural sector was more influential in determining the rural-urban migration pattern than the "push" mechanism in the agricultural sector. Moreover, as equation (6') shows, the differential in the relative magnitude of such "pull" and "push"

mechanisms was even more pronounced over the subsample period (1953-1965) when industrial growth was more impressive.

$$Ln \ f_t = 0.6376 - 0.1661 \ Ln \ P_{Ft} - 0.6252 \ Ln \ EP_{NFt}$$
$$(0.083) \quad (0.047) \quad \quad (0.067)$$

$$D\text{-}W = 2.617; \ \bar{R}^2 = 0.992 \qquad (6')$$

Equations (6) and (6') have been estimated in the context of the comparative statistics of sectoral labor allocation. In reality, however, changes in labor productivity in each sector constantly lead to a disequilibrium situation where earnings differ between the two sectors, thus inducing agricultural workers to move to nonagricultural industries. Because the volume of off-farm migration is likely to be proportional to the difference in sectoral earnings, and because earnings are not included in the reduced form, we may be capturing the migratory flow as a population stock-adjustment process, as expressed below.

$$M_t = k \ [b \ F^* - (F_{t-1} + I_t)] \qquad (7)$$

where M_t = net number of people migrating to (+) or from (-) farms in year t,

F_{t-1} = actual farm population at the end of the previous year,

I = natural increase of farm population from births and deaths, and

k, b = parameters to be determined statistically, taking the value range of 0 to 1.

F* represents equilibrium farm population, which is derived from the following equation:

$$F^* = \hat{f}_t \ LF_t / r_t, \qquad (8)$$

where $\hat{f}_t$ is computed from equation (6), LF_t, the total labor force, and r_t, the ratio of farm workers to farm population. It should be further noted, however, that primarily because the sample period under study corresponds to a period of rapid decline in the relative

allocation of labor in agriculture, $\hat{f}_t$ tends to overestimate the equilibrium value. To cope with this problem the parameter, b, is used as a weight, as shown in equation (7).

By utilizing equation (6), we have computed $\hat{f}_t$ for the sample period, which in turn, has been used to estimate the following statistical relationship:

$$M_t = 0.0442 \; F^*_t - 0.0727 \; (F_{t-1} + I_t)$$
$$ (0.022) (0.023)$$

$$\overline{R}^2 = 0.328 \qquad (9)$$

Putting this result in the stock-adjustment form, we have the following expression:

$$M_t = 0.0727 \; [0.608 \; F^*_t - (F_{t-1} + I_t)] \qquad (10)$$

The estimated coefficients agree with a priori expectations as to sign as well as magnitude. Annual net migration averaged about 7% of the difference between equilibrium farm population and the number of people who would stay on farms in the absence of migration. Equilibrium farm population, on the average, corresponds to about 60% of the value computed from equation (6).

The analysis of this section has shown that despite its simplicity, the reduced form of the Harris-Todaro model can capture very well the long-term trend of Japan's postwar migratory streams from rural agricultural to urban industrial sectors. One of the results indicates that productivity improvements, not only in the industrial sector but also in the agricultural sector, contribute to a decline in the proportion of the labor force in agriculture. This finding implies that in contemporary developing countries, steady migration from farm to city would be a concomitant of economic development. It would also proceed unchecked unless significant governmental interventions were made to retain the rural population in agriculture.

It should be noted, however, as a limitation to the above analysis, that the fraction of labor force engaged in agriculture could change as a result of rural industrialization without any

spatial migration. Although the Harris-Todaro model explicitly considers the role of physical rural-urban migration in equating the expected income for the urban manufacturing sector with the wage rate for the rural agricultural sector, in the above analysis it is counted as rural-urban migration if (a) the person physically moves away from farm to city, or (b) the person shifts employment without changing his residence.

V. Concluding Remarks

The volume of internal migration in postwar Japan has been heavily influenced by the performance of economic growth. During the rapid economic growth period up to an early part of the 1970s, the number of intermunicipality migrants grew continuously. Over this period, the size of cohorts entering the labor force also contributed to this monotonic increase in the migratory movement. During the slow economic growth period starting from the first oil crisis of 1973, however, the volume of intermunicipality migration has been continously decreasing.

The changes in the tempo of economic growth have affected not only the level but also the pattern of internal migration. Information up to the mid-1960s points to the predominance of long distance movements involving interprefectural transfers, characterized by relatively unidirectional, male-dominated streams from nonmetropolitan origins to metropolitan destinations. From the late 1960s onward, however, while long distance flows continued to be a vital component of the total migration pattern, the directions have been rapidly changing. Counterstreams to these population movements have become increasingly pronounced, and a centrifugal drive to the nonmetropolitan region has steadily grown, thus replacing the centripetal pull to the metropolitan region.

The emergence of multidirectional migration beginning from the late 1960s are directly reflected upon intertemporal changes in the determinants of interprefectural migration. The regression results based upon the 1970 and 1980 Population Censuses have shown pronounced differences with regard to a few determinants. The most marked difference is that although housing was not a principal factor to account for interprefectural migration in 1970, it is one of the main

variables in 1980.   The other major difference between 1970 and 1980
results is that the effect of the government development plans upon
the interprefectural migratory flow has partially been detected with
respect to the 1970 results.   Apart from these differences, both 1970
and 1980 results have pointed to the importance of the role of
noneconomic factors in the determination of interprefectural migra-
tion.   These noneconomic factors include the availability of urban
amenities, educational, and marriage opportunities. Also, distance is
the most crucial determinant regardless of the migrant's character-
istics.   As opposed to these noneconomic considerations, economic
factors have been identified as essential determinants for certain age
or sex groups.   For instance, the wage differences model has been
supported mainly among males. The job vacancies model has been useful
in explaining interprefectural migration only among young migrants.

     In addition to such comparative static analyses on internal
migration, the present study has also attempted to clarify the basic
interactive process of rural-urban migration in the context of Japan's
postwar economic development. For the purpose of empirical testing, a
reduced form of the Harris-Todaro model has been used. One of the
findings of this empirical analysis is that an increase in produc-
tivity, not only in the industrial sector but also in the agricultural
sector, has contributed to a rapid decline in the proportion of the
labor force in agriculture.   This result is completely in accord with
that for the long-term U.S. experience shown in Suits' recent work.
The other result of this empirical analysis has supported the pre-
dominance of pull factors in urban nonagricultural sectors over push
factors in rural agricultural sectors. However, a major limitation of
this empirical analysis is that no clear distinction has been made
between occupational mobility and spatial migration.

     To consider future prospects of internal migration in Japan, one
should pay close attention to two recent phenomena.   First, there has
been a gradual increase in net in-migration in the three metropolitan
areas in the 1980s.   If this is the beginning of the new migration
trend, overconcentration in the metropolitan areas will be further
aggravated, and the shortage of housing facilities will be more
serious in these densely-populated areas.   Second, although the
overall mobility has been gradually falling in recent years, the
mobility rate among the elderly has been steadily rising. Because the

proportion of the elderly is expected to accelerate in the next few decades,[24] the mechanism of migration among older persons urgently requires a careful examination. These two new dimensions in the population movements should be properly incorporated in the Fourth Comprehensive National Development Plan which is now being formulated by the Government of Japan.

|			
1.	HOKKAIDO	36.	TOKUSHIMA
2.	AOMORI	37.	KAGAWA
3.	IWATE	38.	EHIME
4.	MIYAGI	39.	KOCHI
5.	AKITA	40.	FUKUOKA
6.	YAMAGATA	41.	SAGA
7.	FUKUSHIMA	42.	NAGASAKI
8.	IBARAKI	43.	KUMAMOTO
9.	TOCHIGI	44.	OITA·
10.	GUMMA	45.	MIYAZAKI
11.	SAITAMA	46.	KAGOSHIMA
12.	CHIBA	47.	OKINAWA
13.	TOKYO		
14.	KANAGAWA		
15.	NIIGATA		
16.	TOYAMA		
17.	ISHIKAWA		
18.	FUKUI		
19.	YAMANASHI		
20.	NAGANO		
21.	GIFU		
22.	SHIZUOKA		
23.	AICHI		
24.	MIE		
25.	SHIGA		
26.	KYOTO		
27.	OSAKA		
28.	HYOGO		
29.	NARA		
30.	WAKAYAMA		
31.	TOTTORI		
32.	SHIMANE		
33.	OKAYAMA		
34.	HIROSHIMA		
35.	YAMAGUCHI		

Prefectures of Japan
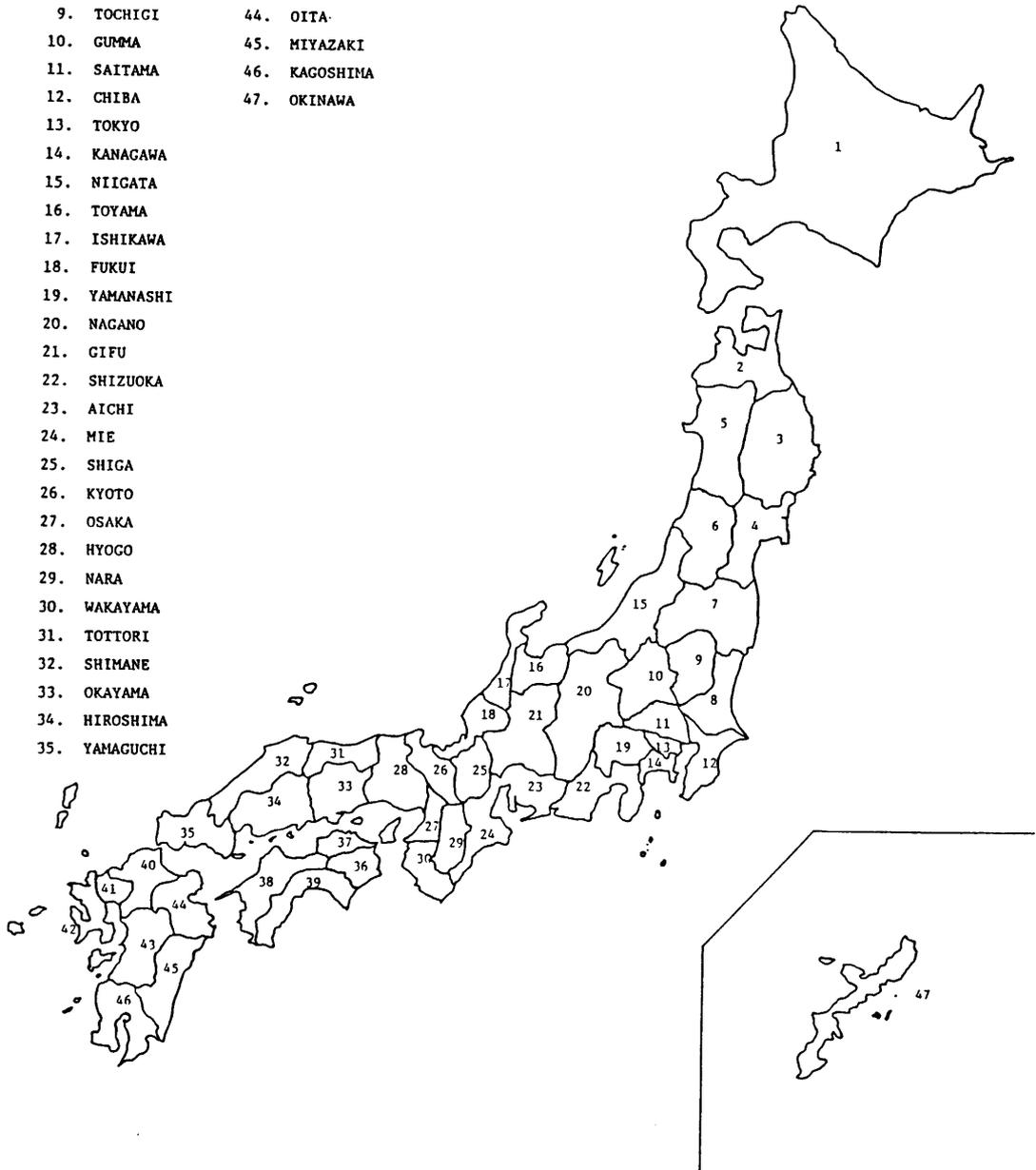
A. HOKKAIDO

B. TOHOKU

C. KITA-KANTO

D. MINAMI-KANTO

E HOKURIKU/TOSAN

F. TOKAI

G. HIGASHI-KINKI

H. NISHI-KINKI

I. CHUGOKU

J. SHIKOKU

K. KYUSHU

Regions of Japan
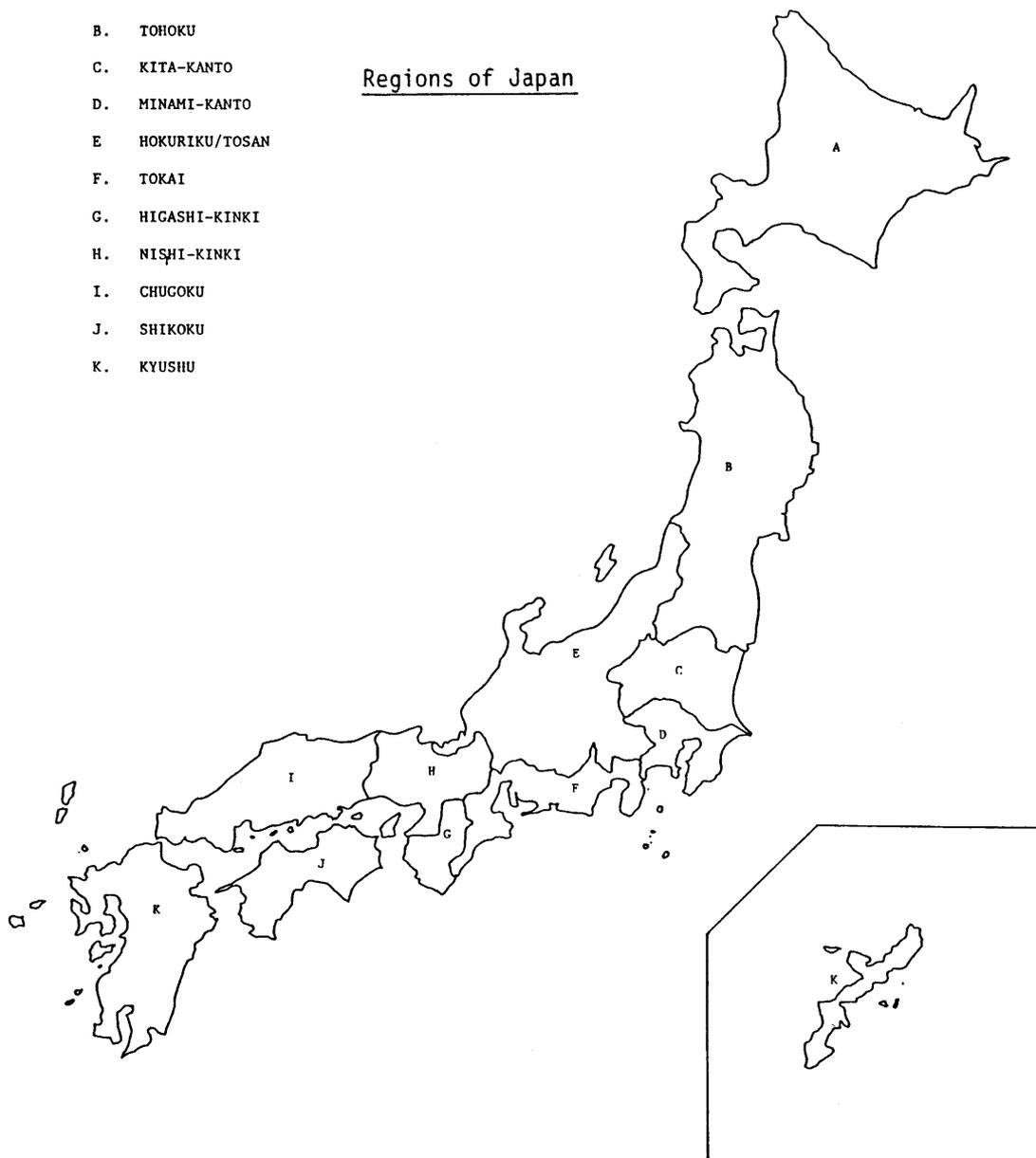
Appendix II

Regression Results on the Determinants of Interprefectural Migration within Metropolitan Areas for Selected Age-Sex-Specific Groups in 1970

Dependent variable	DISTANCE	DEXWAGE	DEMP	DHOUSING	DURB	DATTAIN	DEDUC	DSXRATIO	INTERCEPT	$\bar{R}^2$
Age group 15-34										
BMR1534	-0.2149** (0.034)	-0.0472 (0.173)	-0.6582 (1.133)	7.6796 (36.291)	0.0262 (0.111)	0.0904 (0.094)	0.0164 (0.018)	-10.1220 (7.561)	5.7835** (0.609)	0.309
MMR1534	-0.2288** (0.037)	-0.1487 (0.162)	0.5962 (0.971)	-2.2614 (39.739)	0.1434 (0.097)	-0.0321 (0.074)	0.0030 (0.010)		0.2943** (0.657)	0.305
FMR1534	-0.2009** (0.032)	-0.5772 (1.732)	-0.8275 (1.112)	-2.1195 (45.982)	0.0444 (0.166)	0.0099 (0.294)	0.0214 (0.023)	-11.6830 (10.327)	5.2728** (0.565)	0.307
Age group 15-24										
BMR1524	-0.3940** (0.065)	0.7565 (0.979)	-4.4050 (3.278)	117.2000 (89.645)	-0.1924 (0.248)	-0.6728 (0.321)	0.0695 (0.039)	-13.1860 (9.350)	10.7330** (1.151)	0.396
MMR1524	-0.4067** (0.070)	-0.2753 (0.465)	0.2628 (2.974)	-2.1770 (78.091)	0.2257 (0.169)	-0.1673 (0.209)	0.0215 (0.024)		11.7090** (1.253)	0.386
FMR1524	-0.3809** (0.061)	-1.0339 (2.492)	-1.7187 (2.918)	77.0110 (90.806)	0.0320 (0.227)	-0.2782 (0.387)	0.0343 (0.025)	-15.1810 (11.495)	9.7535** (1.094)	0.371
Age group 25-34										
BMR2534	-0.3468** (0.057)	0.2194 (0.387)	0.0596 (1.017)	-0.0377 (59.957)	0.0274 (0.187)	0.0775 (0.091)		8.3945 (29.825)	9.1809** (1.01)	0.279
MMR2534	-0.3773** (0.062)	0.0913 (0.295)	0.0338 (1.384)	-10.7940 (62.556)	0.0835 (0.141)	-0.0739 (0.096)			9.9986** (0.141)	0.281
FMR2534	-0.3152 (0.051)	0.5463 (0.450)	0.6228 (0.722)	14.7000 (53.745)	0.0411 (0.127)	-0.1595 (0.107)		1.9190 (18.518)	8.3327** (0.902)	0.299

Number of observations = 90. Standard error in the parentheses.
** Significant at the 1% level.

1. Information on migration within the same municipalities is excluded from this report series. It should be also noted that because there were major changes in boundaries in many municipalities in 1954, the data for 1954 need to be carefully interpreted.

2. The intermunicipality mobility rate is defined as the percentage of the total number of intermunicipality migrants to the mid-year total population.

3. These two factors are expected to capture the effect of an interplay of labor demand and supply upon overall mobility.

4. Although a few alternative measures for prefectural income disparities have been incorporated in the analyses, they have yielded highly comparable results. The alternative measures tested include the ratio of the average of the ten highest prefectural incomes to that of the ten lowest prefectural incomes.

5. Both simple correlation and regression analyses have been conducted for different time periods for comparative purposes. For the period 1955-1983, for instance, the results have been considerably poorer than those for the period 1955-1971. Because the regression result for Eq. (3) suggests the presence of autocorrelation, we have attempted another regression, employing the generalized least square method. The re-estimated result, however, has been basically the same as that for the ordinary least square method.

6. Starting from the early 1970s, the supply of condominiums has been growing at a phenomenal rate. Consequently, it was estimated that there was an excess supply of 50,000 condominiums in the early 1980s. See, for example, Kazumasa Kobayashi and Keiichi Tanaka, "Families, Households and Housing," Population of Japan, Country Monograph Series, 11, United Nations ESCAP, (Bangkok 1984): 140-162.

7. It should be noted that a considerable proportion of out-migration from Hokkaido can be attributed to the shrinking coalmining industry in the 1960s and 1970s.

8. During the intercensal period 1975-1980, Miyagi Prefecture had a total of 27,858 net in-migrants and Fukuoka Prefecture, a total of 59,753 net in-migrants.

9. For a more detailed discussion on these factors, see Hiroshi Kawabe, "Jinko no chiikiido to teijuken (Regional Population Mobility and the Human Settlement)," Jurisuto 11 (Tokyo, 1978): 64-69.

10. This is equivalent to the Gini Coefficient.

11. For a detailed discussion of these three development plans, see Saburo Okita, et al, "Population and Development: The Japanese Experience," in World Population and Development: Challenges and Prospect, edited by Philip M. Hauser, Syracuse University Press (1979): 296-338.

12. From a policy point of view, further in-depth analysis on changing mobility patterns among the elderly is urgently required in order to gain insight into family structural transformations in Japan's rapidly aging society.

13. Prior to 1959, no data on the sex composition of the inter-prefectural migrants were gathered in the Migration Report Based on Resident Registration.

14. The population, which is the denominator in the computation of the gross migration rate, has been obtained by reversing the census result by half a year.

15. Although we have attempted, by following the Minami-One study, to use the percent level of labor force in these two industries in the regression analysis, our preliminary results have shown that it is a poor predictor representing the availability of employment opportunities. It is conceivable that because in recent years, most of the prefectures have already had a very high percentage share of non-agricultural labor force, the variable used in the Minami-One study fails to represent a level of job vacancies in the context of contemporary Japan.

16. Due to the unavailability of data, the variable, EDUC, in the 1970 data set is based upon the data observed in May in 1970. In addition, the definition of this variable differs slightly between the data set for 1970 and that for 1980. Because there are no data on the enrollment of vocational schools around 1970, EDUC in the 1970 data set refers only to universities and junior colleges. This difference in the coverage between these two data sets is expected to affect our estimated results only marginally because the growth of vocational schools is only a recent phenomenon.

17. For a more detailed discussion on the simultaneity bias in the migration analysis, see Michael J. Greenwood, "Research on Internal Migration in the United States: A Survey," The Journal of Economic Literature 13, No. 2 (1975): 397-433.

18. Alternatively, regional variations in each explanatory variable can be measured in the form of a ratio rather than a difference. Although we have attempted to analyze our data set using ratios, the computational results have been basically the same as those based upon differences.

19. Although Japan's unemployment rate has been rising to a slight extent since the mid-1970s, it is still considerably lower, as compared with the rates for other industrialized countries. According to the 1980 Population Census, the mean of the 47 prefectures for both sexes was 2.34% with the standard deviation of 0.69. It was 2.73% with the standard deviation of 0.82 for males, and 1.78% with 0.51 for females. These unemployment rates were even lower in 1970. In view of such small regional differences in unemployment rates, we have made allowance for the effect of unemployment rates upon migratory flow by incorporating them in the computation of expected earnings instead of including them in the regressions as a separate explanatory variable.

20. See, for example, Ernesto Pernia, "An Empirical Model of Individual and Household Migration Choices: Philippines, 1965-1973," Philippine Economic Journal 18, Nos. 1-2 (1978): 259-284.

21. The mean age at marriage has been relatively stable in recent years, approximately 25 years for females and 27.5 years for males.

22. Because Okinawa Prefecture was reverted to Japan in May of 1972, our analysis based upon the 1970 data set has excluded Okinawa from its observations.

23. The DID concept was adopted in the 1960 Population Census as a new definition of urban population based upon population density. DIDs are demarcated on the basis of enumeration districts. If contiguous enumeration districts have more than 4,000 persons per km^2 each and the total population of these enumeration districts is more than 5,000, then this area is defined as a DID.

24. See Naohiro Ogawa, "Economic Implications of Japan's Ageing Population: A Macro-economic Demographic Modelling Approach," International Labour Review 121, No. 1 (1972): 17-33.

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